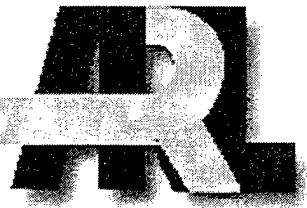


ARMY RESEARCH LABORATORY



Virtual Environment Study of Mission- Based Critical Information Requirements

Elizabeth S. Redden

ARL-TR-2636

MARCH 2002

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ARL-TR-2636

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Virtual Environment Study of Mission- Based Critical Information Requirements

Elizabeth S. Redden

Human Research & Engineering Directorate, ARL

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Abstract

The Human Research and Engineering Directorate of the U.S. Army Research Laboratory conducted an experiment to determine the critical information required by soldiers in four echelons (squad member, fire team leader, squad leader, and platoon leader). This information is intended for use in the development of the design requirements for information systems such as the Smart Sensor Web. The experiment was conducted in the Dismounted Battlespace Battle Lab's Squad Synthetic Environment (SSE), a virtual environment that allows the squad to participate in force-on-force exercises. A validation study of the SSE was conducted before the start of the experiment to ensure that information gathered in the virtual environment would be comparable to that gathered in a live experiment. The eight squads that participated in the experiment conducted infantry operations using scripted vignettes that were prepared to include as many situations as possible that are typically encountered during infantry operations. After participation in each vignette, soldiers rated the criticality of each of the situational awareness (SA) items on a questionnaire. This questionnaire was developed after a literature search and a subject matter expert conference that were conducted to gather potential SA critical information items.

ACKNOWLEDGMENTS

The authors wish to thank the several individuals from the U.S. Army Infantry School and the U.S. Army Research Laboratory (ARL) for their contribution to the study. First, we would like to thank Dan Turner. Without his assistance, this study would not have been possible. He led in the development of the scripts for the vignettes, and his extensive combat experience was crucial to the validity of the scripts and questionnaires used. In addition, his leadership skills were instrumental in the smooth running of the experiment. Bill Youngblood's assistance in the preparation of the scripts and in running the Platoon Headquarters and White Cell was very valuable. We also wish to thank SFC John Corderro-Torres and Jeffrey Everette for assisting in performing the literature search. Cindy Holloway was instrumental in the data reduction, questionnaire administration, and editing of the final report.

The authors further thank Nancy Nicholas of ARL for technically editing this document.

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Executive Summary

The Human Research and Engineering Directorate of the U.S. Army Research Laboratory (ARL) conducted an experiment to investigate the critical information requirements (CIRs) for four echelons of the infantry platoon operating in and around urban areas during attack, defend, and reconnaissance missions in a virtual environment. The virtual environment used for the study was the Dismounted Battlespace Battle Lab's Squad Synthetic Environment (SSE). We validated the use of the SSE by conducting a "clear a room" vignette in the McKenna military operations on urbanized terrain (MOUT) site (see Figure 1), Fort Benning, Georgia, and by conducting the same vignette in the SSE. The results from both exercises were compared, and similar results were found in both environments.

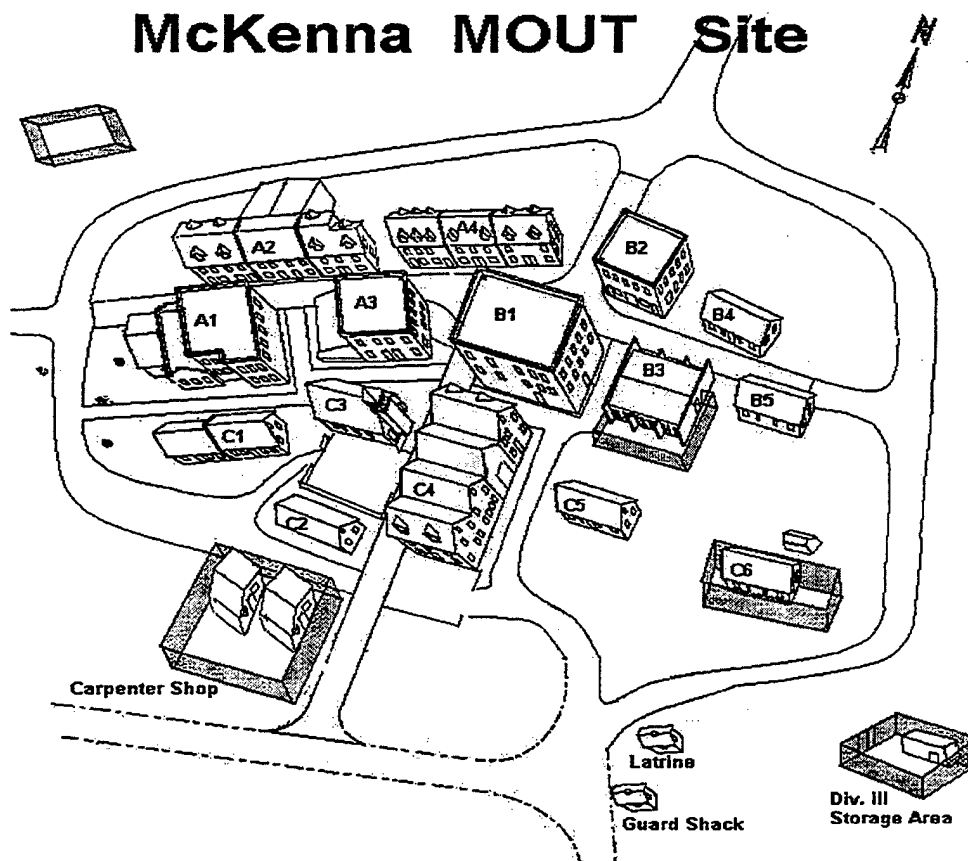


Figure 1. McKenna MOUT Site Layout.

A thorough literature search was conducted to document hypothesized CIRs for attack, defend, and reconnaissance missions. Next, a subject matter expert (SME)

panel comprised of current and former infantrymen was convened to generate CIRs that were specific to the scenarios used in the study and that were tailored by echelon. The literature search and the SME panel provided a large quantity of possible CIRs to be evaluated. To focus the study, an additional panel of SMEs convened with the purpose of reviewing the CIR literature search results and selecting CIRs to evaluate in the vignettes. The panel based CIR selection on criticality and relevancy to proposed vignettes. At the completion of the SME review, CIR questionnaires were constructed. These questionnaires were administered after the soldiers conducted each of the vignettes in the SSE so that the soldiers could rate the criticality of the proposed information requirements to the conduct of the vignette.

Findings indicate that information that should be rushed to the platoon members should be limited to only the critical information that affects their decisions or actions. This would result in less cluttered displays that are easily read and understood. Soldiers should be allowed to "pull" information that is less critical or that is only needed occasionally. Since squad members make very few decisions, they need less information than the higher echelons do. The information provided to squad members should only concern items that they have the ability to impact and items that cause them to take a particular course of action.

Criticality of the knowledge of the opposing forces' (OpFor) location beyond 50 meters from the objective increases as the level of leadership increases. Squad members are interested in their objective and are somewhat interested in the OpFor location within 50 meters of their objective. The leaders are interested in the location of the OpFor all the way to 1 kilometer because this knowledge is important in their planning.

VIRTUAL ENVIRONMENT STUDY OF MISSION-BASED CRITICAL INFORMATION REQUIREMENTS

1. Introduction

1.1 Background

The primary design driver for information technology (IT) systems often appears to be expedience rather than human strengths and limitations. Many systems have been designed to provide the soldier with the information that can easily be obtained rather than first determining the type of information that is most needed. The Project Manager (PM) of the Deputy Under Secretary of Defense (Science and Technology) (DUSD[S&T]) Smart Sensor Web (SSW) initiative recognized this potential problem and addressed it by commissioning the U.S. Army Infantry Center (USAIC) and the U.S. Army Research Laboratory's (ARL) Human Research and Engineering Directorate to perform a study in support of the program. The purpose of the study was to investigate the critical information requirements (CIRs) for members of an infantry platoon operating in urban terrain. The results from this study will be used to document information requirements that should influence the design of the SSW. Two studies preceded the current study and acted as pilot tests for the methodology used.

1.1.1 Situational Awareness and Communication Experiment for Military Operations in Urban Terrain – Experiment I (SA-CE I)

The SA-CE I was conducted by ARL in support of the military operations in urban terrain (MOUT) advanced concept technology demonstration (ACTD) (Redden & Blackwell, 2000). This experiment successfully demonstrated the utility of the situational awareness (SA) assessment center methodology. It also piloted the concept of using an assessment center to determine CIRs for specific missions. The assessment center methodology placed squad-sized elements in vignettes at the McKenna MOUT facility in Fort Benning, Georgia. The vignettes required them to fight against a live opposing force (OpFor) whose movements and actions were scripted. At the completion of the short vignettes, the soldiers were given an assessment of knowledge questionnaire to determine the level of SA they achieved during the vignette. They also gave a subjective rating of the importance of the SA elements to the conduct of the mission.

1.1.2 Smart Sensor Web Pilot Test

This test was also conducted at the McKenna MOUT facility and used live OpFor in scripted vignettes. The assessment center methodology was able to discriminate between baseline and technology-enhanced conditions, demonstrating the potential of the SSW to increase the SA of the infantry squad. At the pauses in the vignettes, soldiers were administered a subjective

questionnaire that required them to evaluate the importance of the SA information elements to the conduct of the vignettes. This study also demonstrated the usefulness of placing soldiers in vignettes to evaluate the importance of CIRs to specific missions.

1.2 Purpose

The purpose of this study was to investigate the CIRs for four echelons of the infantry platoon (squad member, team leader, squad leader, and platoon leader) operating in urban areas during attack, defend, and reconnaissance missions.

2. Method

2.1 Apparatus

2.1.1 Squad Synthetic Environment

The CIR study was performed with the squad synthetic environment (SSE) simulator housed at Fort Benning. The study was executed by ARL, with the support of the Simulations and Modeling Division of the Dismounted Battlespace Battle Lab. The simulator configuration used for this study consisted of a command center (two control personal computers [PCs]), nine interactive soldier visualization stations (SVS), a maximum of eight PC OpFor and civilian on the battlefield (COB) interactive stations. Pleban, Eakin, Salter, and Matthews (2001) provided additional information about the configuration of the SSE simulator.

2.1.2 Validation Study

A validation study was conducted to ensure that the data obtained with the simulator would be consistent with data obtained during live operations. During the validation study, the soldiers used in this study conducted a vignette that had previously been conducted in a live exercise at McKenna MOUT site by three Ranger platoons. At the conclusion of the vignettes (both live and simulation), soldiers were administered a CIR questionnaire that asked them to rate the importance of specific information requirements in the vignettes. The results from the ratings from both exercises are given in Appendix A. The importance ratings of the information to the soldiers in the simulation vignette were then compared to the importance ratings of the soldiers who conducted the live vignette to determine whether the information requirements in the simulator were similar to the cognitive requirements in the live exercises.

2.2 Methodology Background

A literature search was conducted to evaluate methodologies that had been used in the past to determine or document CIRs. Payne, Bettman, and Johnson (1993)

placed subjects in a static simulator in which they selected items for consideration with mouse clicks. The CIRs were determined to be those that were most frequently chosen with mouse clicks. Endsley (1993) surveyed SA requirements in air-to-air combat fighters. She used unstructured interviews with subject matter experts (SMEs) and a goal-directed task analysis to develop structured information requirement questionnaires. Additional SMEs then performed criticality ratings of the potential CIRs contained in the structured questionnaires. In both the SA-CE I and SSW Pilot Test, ARL used SMEs to develop critical SA requirements, which were then given criticality ratings by the participants after they completed the assessment center vignettes.

2.3 Current Methodology

2.3.1 Literature Search

An extensive literature search was performed to find CIRs for the following mission-based scenarios: clearing a building, defending a MOUT objective, and reconnoitering a MOUT objective. Although no previous experiments or studies were found that were conducted solely to address infantry CIRs, several references hypothesized CIRs for different echelons of infantry soldiers. The four echelons of infantry soldiers considered in the literature search were squad member, team leader, squad leader, and platoon leader. The results of the literature search are a compilation of CIRs for each aforementioned echelon, as well as for the three mission-based scenarios and are given in Appendix B. Information sources and references cited include Army training and evaluation plans; U.S. Army field manuals; the U.S. Army Ranger Handbook (SH 21-76); Army Research Institute technical reports; data from two joint experiments conducted by the MOUT ACTD at the U.S. Army Dismounted Battlespace Battle Lab and the U.S. Marine Corps Warfighting Lab (JE1 and JE2); and data collected during SA-CE I. A SME panel comprised of current and former infantrymen was convened to generate CIRs that were specific to the scenarios used in the study and that were tailored by echelon.

The literature search and the SME panel provided a large quantity of possible CIRs to be evaluated. To focus the study, an additional panel of SMEs convened with the purpose of reviewing the CIR literature search results and selecting CIRs to evaluate in the vignettes. The panel based CIR selection on criticality and relevancy to proposed vignettes. At the completion of the SME review, CIR questionnaires were constructed.

2.3.2 Vignette Development

Vignettes were developed for the three mission-based scenarios selected for this study (clearing a building, defending a MOUT objective, and reconnoitering a MOUT objective). The vignettes were tailored to meet virtual environment requirements. Scripts were written for each vignette, which controlled the movement and action of the OpFor and COBs. An attempt was made to vary the scripts and the vignettes so that the soldiers would be confronted with as

many conditions as possible during the conduct of the experiment. Table 1 provides a description of the vignette tactics and scripts used for the CIR study.

Table 1. Description of Vignette Tactics and Scripts

Vignette	Tactics	Script 1	Script 2	Script 3
A	Squad attacks and clears a freestanding building that consists of four rooms. Squad attacks across an open danger area.	Three OpFor located on the objective. Three COBs co-located with OpFor.	Three COBs dead on the objective. Six OpFor mount counterattack.	Four OpFor located on the objective. Three COBs co-located with OpFor.
B	Squad defends and prepares for counter attack. Squad occupies the second floor of a building and observes OpFor activity on the eastern half of McKenna MOUT site.	Six OpFor in two different buildings; all move to attack squad. Four total COBs: two in a building and two in vicinity of the cemetery.	Seven OpFor in two different buildings; three move to attack squad, four fire from one building (two OpFor KIA in the building). Three COBs; all KIA in an open area.	Eight OpFor in two different buildings; four move to attack fire team A and (squad and) four attack fire team B (fire from one building).
C	Squad conducts a reconnaissance from the wood line, observing OpFor activity on the southern half of McKenna MOUT site.	Four OpFor preparing defensive positions in four different buildings. Three COBs move in an open area. Obstacle and vehicle (moving) in an open area.	Four OpFor preparing defensive positions in two different buildings. Two COBs move in an open area. Obstacles and vehicle (stationary) in an open area.	Four OpFor preparing defensive positions in four different buildings. Three COBs under heavy guard by OpFor; one killed by OpFor in an open area.

KIA = killed in action

2.3.3 Experimental Design

Eight squads participated in the study; each squad completed one of the three scripts for each vignette, as shown in Table 2.

2.4 Subjects

Eight squad-sized elements of soldiers and their platoon leaders were used for this study. The first six squads were comprised of soldiers from the 1/167 INF Alabama National Guard. The seventh squad was from Bravo Company, 1/30 INF 3ID (M) (Fort Benning), and the remaining squad was from Bravo Company, 1/29 INF (Fort Benning). Complete results of the demographics are given in Appendix C.

Table 2. Squad Matrix

Squad	Vignette A			Vignette B			Vignette C		
	Script 1	Script 2	Script 3	Script 1	Script 2	Script 3	Script 1	Script 2	Script 3
1	X			X			X		
2	X			X			X		
3	X			X			X		
4		X			X			X	
5		X			X			X	
6		X			X			X	
7			X			X			X
8			X			X			X

The six National Guard squads were close to full strength (a total of 48 soldiers) and had an average age of 31 years. They had an average of 13 years of education and 115 months of military service, with 61 months in their current positions. Most (88%) of the soldiers were infantry (qualified as 11M), with (an additional) 6% qualified 11B. Average military training and instruction received in light infantry operations (including classroom training and field exercises) was 16 months. Their self-evaluation of individual knowledge, skills, and abilities was average.

The 3ID (M) squad and the 1/29 squad were nearly full strength (a total of 17 soldiers) and had an average age of 24 years. They had an average of 13.6 years of education and averaged 47 months of military service with 43 months in their current positions. All the soldiers were infantry, with 12% qualified 11B. Average amount of military training and instruction received in light infantry operations (including classroom training and field exercises) was 10 months. Their self-evaluation of individual knowledge, skills, and abilities was average.

The subjects from the live validation exercise were nine Ranger squads from A and C Companies, 3rd Battalion, 75th Ranger Regiment, Fort Benning. The squads were at full strength (a total of 84 soldiers) and the soldiers' average age was 22 years. The Rangers had an average of 12.7 years of education with a mean general technical score of 118. They averaged 24 months of military service and 11 months in their current positions. Their self-evaluation of individual knowledge, skills, and abilities was slightly above average.

2.5 Instruments

2.5.1 Demographic Questionnaire

The demographic questionnaire was used to collect soldier military service, training, and experience data. The demographic questionnaire also included a

self-rating of knowledge, skills, and abilities related to infantry duties. The questionnaire was administered to the soldiers upon their arrival at the SSE simulator. (Detailed results are given in Appendix C.)

2.5.2 CIR Questionnaires

The CIR questionnaires were administered during pre-planned pauses in the vignettes. They required the participant to give a subjective rating on a 7-point scale (importance to the completion of the mission) of each of the information requirements contained in the CIR questionnaire. Items rated 5 to 7 were rated as being necessary for mission performance. Thus, the soldiers were able to place themselves into an actual scenario to determine how important the CIRs were to their positions in the platoon. See Appendix A for the CIR questionnaires.

3. Results

3.1 Validation Study

Forty-seven of the soldiers from the simulation exercise and 72 of the soldiers from the live exercise were used in the validation study. The mean ratings of criticality and standard deviations for the live and the simulation iterations of the validation study are given in Table 3. The questions from the live and the simulation exercises are listed in order of ratings from highest criticality to lowest criticality.

Independent sample t-tests were conducted to determine whether the criticality ratings during the simulation exercise were similar to the ratings given during the live exercise. Eight of the eleven t-tests were significant. However, examination of the order of the criticality ratings (see Table 3) revealed that the ordering of the criticality of the information requirements was very consistent between the live and simulated exercises. There was a 0.55 mean difference among the 11 ratings from the live and simulation exercises. In all cases, the soldiers from the simulation exercises rated the criticality of the information requirements higher than did the soldiers from the live exercises. This makes intuitive sense because the soldiers in the live exercises were receiving information from all five of their senses and had better peripheral vision. The soldiers in the simulation only had information from a two-dimensional visual display and from the "open microphone radio" that was used in the simulator so that the squad members could talk to each other and so that the squad leader and platoon leader could maintain communications. Information from outside sources would thus seem to be more critical to soldiers in the simulator than to soldiers in a live exercise. When the mean difference (0.55) was subtracted as a constant from the simulation ratings and independent sample t-tests were run, there were no

Table 3. Priority Ratings of Information Requirements

Priority	Information Requirements				Information Requirements			
	Live	Mean	SD	N	Simulation	Mean	SD	N
1	Q09 OpFor location on objective	5.28	1.35	72	Q09 OpFor location on objective	6.04	1.30	46
2	Q02 Counterattack threats and location	5.08	1.17	72	Q02 Counterattack threats and location	5.62	1.42	47
3	Q05 Type of hostile fire expected from Southeast	4.99	1.32	72	Q11 Platoon sergeant location	5.52	1.46	46
4	Q03 OpFor location outside McKenna	4.92	1.19	72	Q05 Type of hostile fire expected from Southeast	5.50	1.43	46
5	Q08 Company CCP location	4.83	1.16	72	Q03 OpFor location outside McKenna	5.36	1.29	47
6	Q06 OpFor activity reported by A Co.	4.69	.94	72	Q07 Disposition of 2nd Squad	5.34	1.27	47
7	Q11 Platoon sergeant location	4.66	1.30	68	Q06 OpFor activity reported by A Co.	5.32	1.46	47
8	Q04 OpFor element rate of movement	4.64	1.26	72	Q01 Anticipated time OpFor will reach McKenna	5.13	1.50	47
9	Q01 Anticipated time OpFor will reach McKenna	4.62	1.20	71	Q04 OpFor element rate of movement	5.09	1.43	46
10	Q10 Disposition of A CO	4.40	1.29	72	Q08 Company CCP location	4.98	1.65	47
11	Q07 Disposition of 2nd Squad	4.39	1.11	71	Q10 Disposition of A Co.	4.79	1.40	47

significant differences between the ratings from the live and the simulation exercises (see Table 4).

3.2 Critical Information Requirements

The detailed results from the CIR questionnaire are given in Appendix A. Table 5 displays a compilation of the results from all the questionnaires (i.e., the attack, defense, and reconnaissance questionnaires for planning, occupying an attack position, and executing the vignettes). It combines the information requirements on the soldiers' questionnaires into information requirement categories (i.e., all questions concerning the number of OpFor are grouped into an information requirement category). It also displays the mean of the question means in that category by echelon. Items rated 5.5 and higher were considered to be critical. We chose this mean rating cutoff by adding 0.55 (the mean difference between the live and simulator ratings that was considered to be simulator inflation) to the 5.0 (necessary for performance) scaled item.

Table 5 also presents the level of SA for each of the information requirements. Endsley (1987, 1988, 1995) defined SA as "the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future." Endsley's definition of SA discussed three levels: perception, comprehension, and projection. Perception (Level 1 SA) is the lowest level of SA because it involves only the conscious knowledge that something is present in the environment. Level 2 SA or comprehension is the synthesis of disjointed perceptions so that understanding of the significance of the perceptions is present. Projection (Level 3) SA is the ability to project future courses of action, based on the understanding gained from Level 2 SA.

3.2.1 Location of OpFor on the Objective

Knowledge of the location of the OpFor on the "objective"¹ was critical to all echelons before the attack. This knowledge was critical for planning the execution of the attack.

3.2.2 Size of the OpFor on the Objective

The number of OpFor on the objective was critical during the planning and execution of the attack to all echelons. It was also critical to all echelons during the planning and execution of the reconnaissance mission.

¹ A key piece of terrain identified by the commander to be seized or held.

Table 4. Comparison of Live and Simulation Ratings

Information Requirements	Simulation Adjusted Mean	Live Mean	t-value	df	2-tail Significance
Q01. When do you anticipate that the platoon-size OpFor element will reach McKenna Village?	4.58	4.62	-.17	116	.87
Q02. Do you have any OpFor counterattack threats? If so, from where?	5.07	5.08	-.07	117	.95
Q03. Are there any reports of OpFor platoon-sized units outside McKenna Village? If so, where are they?	4.81	4.92	-.48	117	.63
Q04. If yes, what is the rate of movement?	4.54	4.64	-.41	116	.69
Q05. What type of hostile fire do you expect to receive from the OpFor southeast of McKenna?	4.95	4.99	-.14	116	.89
Q06. What OpFor activity was reported by A Co.?	4.77	4.69	.34	117	.74
Q07. What is the disposition of the 2nd Squad?	4.79	4.39	1.78	116	.08
Q08. Where is the Company CCP?	4.43	4.83	-1.57	117	.12
Q09. Where are the OpFor on your objective?	5.49	5.28	.86	116	.39
Q10. What is the disposition of A Co.?	4.24	4.40	-.66	117	.51
Q11. Where is your platoon sergeant?	4.97	4.66	1.19	112	.24

Table 5. Summation of CIR Questionnaire Results

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Ref No.	Information Requirement Category	SA Level	Question Number	PL	SL	FTL	SM
1	Location of OpFor on objective	Per	Offor AO7	6.67	6.06	6.12	6.15
2	Size of OpFor on objectives	Per	AP1, AO6, AA1, BP1, CP1, CR1	6.17	6.37	6.36	5.95
3	Type of OpFor activity	Per	AA4, BD2, CP18	5.79	5.80	5.81	5.32
4	Location of OpFor outside of objective but within 50 meters of objective	Per	AO8, AA 2, BD3, CP17, CR9	5.71	6.22	5.79	5.61
5	Location of OpFor greater than 50 meters but less than 1 km away from objective	Per	AA5, BP4, CR3, CR8	5.93	5.97	5.83	5.38
6	Existence of OpFor special direct fire weapons	Per	AP2, AP3, AO17, BP2, CP2, CP3, CP4, CP5	6.22	6.06	6.28	5.83
7	Existence of OpFor indirect fire weapons	Per	AP9, BP5, CP9	5.56	6.08	6.11	5.36
8	OpFor special equipment such as night vision and long range optics	Per	AO20, CP16, CR11, CR12	6.06	6.09	5.79	5.67
9	Existence of OpFor air support	Per	AP10, CP10	5.34	5.97*	5.77	5.31
10	OpFor NBC capability	Per	AP7, CP11	5.67	6.45	6.10	5.66
11	OpFor reinforcement capability	Per	AP6, AO12, AA3, AA7, BP4, BD1, BD5, CP8, CR2	5.82	6.02	5.91	5.42
12	Direction of OpFor movement	Per	AA6, BD4	5.83	6.17	5.80	5.20
13	OpFor ammunition status	Per	BP18	5.00	5.72	5.57	5.18
14	Number of dead OpFor	Per	AO1, AO3	4.20	4.61	5.36	4.43
15	OpFor physical and mental status	Comp	AO18, AO21	5.42	5.42	5.37	5.17
16	Strongest OpFor location	Comp	AP21	6.67	6.28	5.98	5.52
17	Weakest OpFor location	Comp	AP20	6.50	5.94	5.57	5.28
18	OpFor knowledge of your activities	Proj	BP12	5.33	6.78	6.18	6.07
19	OpFor intent and projection of enemy activity	Proj	AP5, AO10, AO11, AO22, AA8, BP3, BP10, BP17, BP20, BD6, CP7, CP 31, CR4, CR15 CR20	5.70	5.87	5.86	5.50

Table 5 (continued)

Civilians on the Battlefield (COBs)						
20	Presence of COBs	Per	AP11	5.67	5.61	5.47
21	Location of COBs on objective	Per	CP14	4.83	5.39	4.97
22	Number of COBs on objective	Per	CP12, CR5	5.17	5.31	4.88
23	Temperament or status of COBs on objective	Comp	AP13, AO13, CR6	4.80	5.31	4.94
24	Temperament or status of COBs around objective	Comp	AO2, AO4, BP6, CP13	4.35	5.06	4.69
25	COB KIAs	Per	AA9	5.06	5.11	4.92
26	Differentiate between COBs and OpFor	Comp	AP12	5.00	5.50	5.15
Friendly Troops						
27	a. Friendly location	Per	AO16, AA10, BD7,	5.80	5.58	5.76
28	b. Friendly identification	Per	AO14, AO15, BP9, CP15	4.89	5.31	5.35
29	Friendly physical and mental stats	Comp	AO19, AA16, CP30	5.48	5.92	5.72
30	Attachments or detachments to the squad	Per	AP19, BP11	4.50	4.94	4.92
31	Knowledge of other friendly unit activity	Comp	AP16, AA14, BP15, CR13	5.32	5.57	5.36
31	Friendly wounded in action/killed in action (WIA/KIA)	Per	AO5, AA11	6.33	5.59	5.50
32	Strongest Friendly location	Comp	BP14	5.50	6.17	5.88
33	Weakest Friendly location	Comp	BP13, BD12	6.17	6.00	5.66
Mission Information						
34	Information concerning buildings on the objective	Comp	AP8, AO23, CR16, CR17, CR18, CR19	5.98	6.11	5.40
35	Knowledge of terrain	Per	BP19, CP19, CP20, CP22, CP25, CP26	5.94	6.00	5.76
36	Obstacles or hazards on potential routes or objective	Per	AP4, AO9, CP6, CP24	6.00	6.07	5.44
37	Knowledge of mission parameters and command and control	Per	AP14, AP15, AP17, AA13, BP7, BP8, BP21, BP22, BD9, CR14	5.52	5.78	5.43
38	a. Friendly ammunition status	Per	AA15, BD11	6.17	6.56	6.45
39	b. When Friendly resupply expected	Per	BD10	4.00	6.22	4.97
39	Secondary missions	Per	AP18, AA12, BD8, CR7	5.03	5.70	5.68
40	Conditions affecting mission (i.e., weather, light level)	Proj	AP22, CP2, CP23, CP27	5.63	5.63	5.56
41	Squad projected routes and movement rates	Comp	CP21, CP28, CP29, CR10	5.83	5.77	5.76

*because of reconnaissance

3.2.3 Type of OpFor Activity

The type of activity in which the OpFor is engaged is important to all echelons during a reconnaissance mission; it is one of the primary purposes of the mission. During the attack, attention is diverted from interest in OpFor activity outside the objective and is focused on areas of immediate concern. During the defense, the squad leadership found information about OpFor activity in the area to be of critical concern. This information helps the squad leadership to know what defensive tactics to employ and when to employ them.

3.2.4 Location of OpFor Outside the Objective but Within 50 Meters of the Objective

During the reconnaissance mission planning and execution, all echelons rated knowledge of the location of the OpFor within 50 meters of the objective as being critical. When the platoon was in the attack position and preparing to attack, their focus narrowed to the immediate objective. Once the attack was over, the squad became concerned with the location to which the OpFor escaped. During the defense, the squad leadership found information concerning OpFor location within 50 meters to be of critical concern. This information helped the squad leadership to know when and where to shift soldiers and where to direct fires.

3.2.5 Location of OpFor >50 Meters From the Objective but <1 km Away From the Objective and Reinforcement Capability

All three levels of leaders (fire team leader, squad leader, and platoon leader) were concerned with activity beyond 50 meters during the reconnaissance and the defense. During the attack, the fire team leaders were not interested in activity beyond their immediate objective. Squad members were not interested in the location of the OpFor at these distances, nor were they interested in knowledge of the OpFor reinforcement capability and the direction of OpFor movement. Knowledge concerning OpFor reinforcement during the planning of all types of missions is critical. During and immediately after the execution, it is critical to the leadership but not to the squad members.

3.2.6 Existence of OpFor Special Weapons

All four echelons believed that the knowledge of the location and the existence of special OpFor weapons (such as direct fire weapons and nuclear, biological, chemical capability) and special equipment (such as night vision and long range optics) was critical. This knowledge has a direct impact on the actions of all four echelons. In planning for attack and reconnaissance missions, the leadership needs to know critical information such as the location of special direct fire weapons (i.e., machine gun and sniper weapons) to plan their concept of operations. In the defense, the location of special direct fire weapons has a big impact on the squad leadership in preparing their defensive positions. It is important to the squad members because it affects their actions (i.e., whether to "low crawl," to use cover at long ranges or at night, to use smoke, etc.). However,

squad members did not rate the knowledge of indirect fire weapons or air support as critical because this knowledge did not directly affect their actions.

3.2.7 OpFor Physical and Mental Status

Knowledge concerning the number of dead OpFor and the physical and mental status of the live OpFor was not considered critical at any of the four echelons.

3.2.8 Strongest and Weakest OpFor Location

Identification of the OpFor strong and weak points was considered to be critical by all three leadership levels. At these levels, this knowledge can be exploited. The criticality of the knowledge was highest at the highest echelon and next highest at the next level.

3.2.9 OpFor Intent and Projection of Enemy Activity and OpFor Knowledge of Friendly Activities

The leadership rated the comprehension of the OpFor intent and the ability to project their activity as critical. During the planning for defense and counterattack, the squad leaders, fire team leaders, and squad members found OpFor knowledge of friendly activity to be critical. During the defensive mission, the squad was split into two different locations (building C5 and behind a barricade on the north side of C6). The fact that they would have had to cross a danger area to reinforce each other could have been a contributing factor to their being more concerned about the OpFor knowledge of their activities and location.

3.2.10 COBs

Platoon and squad leaders rated knowledge of the presence of COBs as marginally critical. However, most information about COBs was not considered critical. Caution must be used when one is drawing conclusions about this information because in the simulations used for these vignettes, COBs were not capable of hostile fire or of affecting the outcome of the vignette. In a live vignette, where COBs could be hostile to the friendly forces, knowledge concerning their location, temperament, etc., could be critical. Also, if the friendly unit's mission is to extract the civilians, then knowledge of their location and status would be critical.

3.2.11 Friendly Location and Identification

Knowledge concerning the location of friendly units was considered critical at all echelons. The identification of the friendly unit (i.e., what company, what platoon, etc.) was not considered to be critical information.

3.2.12 Friendly Physical and Mental Status

The status of the squad members was considered critical information by the squad leader and below. The platoon leaders considered platoon morale to be critical, but the unit experience level was not considered to be critical.

3.2.13 Attachments to or Detachments From the Squad and Knowledge of Other Friendly Activity

Information in this category was generally not considered to be critical. Although knowledge of attachments to and detachments from the squad is important for accountability and assignments, it is not deemed critical information for planning. Knowledge of friendly unit activity is a critical piece of information during planning and execution of a defensive mission and during the execution of attack and reconnaissance missions. Knowledge of what or who might be to the front, right, left, and rear could play a part in squad movement to and from the objective.

3.2.14 Friendly Wounded in Action (WIA) and Killed in Action (KIA)

This information was critical to the leadership.

3.2.15 Strongest and Weakest Friendly Locations

This knowledge was considered to be critical by all four echelons.

3.2.16 Knowledge of Terrain, Obstacles, Squad Projected Routes and Movement Rates, and Conditions Affecting the Mission

This information was considered to be critical to all echelons.

3.2.17 Knowledge of Mission Parameters, Command and Control, and Secondary Missions

This information was considered to be critical by the squad and fire team leaders.

3.2.18 Knowledge of Friendly Ammunition and Re-supply Status

All echelons felt that knowledge of ammunition status was critical. The expected time for re-supply of water and food was not considered to be nearly as important.

3.2.19 Information Concerning Buildings on the Objective

The leadership rated this information as critical. This information would affect their approach plans and the weapons and equipment that they would take with them for building entry. Squad members do not need this information because they only react to orders from the leadership.

3.2.20 Squad Members

Squad members had fewer information requirements than the higher echelons. Squad members rated only the information that had a direct effect on their actions as critical. For example, knowledge of obstacles or hazards on potential routes was not considered critical because the leaders plan the routes that squad members will take. Many information items concerning the OpFor were considered critical. Squad members wanted to know where the OpFor were located on their objective or where they were located in proximity to their

objective. However, they were not concerned about the OpFor location 25 or more meters beyond the *borders* of their objective. Knowledge of the OpFor weapons and special equipment was considered to be critical because they affect squad member posture, need for cover and concealment, and so forth. Knowledge about friendly units, which was considered critical to the squad members, included friendly strengths and weaknesses as well as knowledge about unit physical and mental status. Ammunition status was considered to be critical mission information. Squad members were not as interested in information about COBs. However, this may have been an artifact of the vignettes used, since liberation of the COBs was not a mission objective. Squad members should be situationally aware of items that would cause them individual danger and items that would cause them to take one action or another.

3.2.21 Fire Team and Squad Leaders

The CIRs that were identified by fire team and squad leaders were almost identical. Fire team and squad leaders are small unit leaders. Fire team leaders must be prepared to lead the squad if the squad leader becomes incapacitated and therefore must remain situationally aware of the same issues. The items identified by the squad and fire team leaders as most critical were very similar to those identified by the squad members; however, they did identify additional items (mostly comprehension and projection items) that were important to squad leadership decisions.

3.2.22 Platoon Leaders

The CIRs identified by the platoon leaders were fairly similar to those identified by the squad and fire team leaders. Platoon leaders rated the items that would contribute to their decisions (i.e., weakest friendly location and strongest OpFor location) higher than did the lower echelons. They also rated detailed items having to do with close combat (i.e., differentiation between COBs and OpFor) as non-critical, whereas their subordinates rated them as critical.

4. Conclusions

With current tactics, techniques, and procedures, squad members make very few decisions and therefore need less information than the higher echelons. The information provided to squad members should only concern items that they have the ability to impact and items that cause them to take a particular course of action.

Criticality of the knowledge of the OpFor location beyond 50 meters from the objective increases as the level of leadership increases. Squad members are interested in their objective and somewhat interested in the OpFor location

within 50 meters of their objective. The leaders are interested in the location of the OpFor all the way to 1 km because this knowledge is important in their planning.

Occam's razor (the Law of Parsimony) should be applied to the development of the information displays for the platoon. Information "pushed" to the platoon members should be limited to only the critical information that affects their decisions or actions. This would result in less cluttered displays that are easily read and understood. Soldiers should be allowed to "pull" information that is less critical or is only needed occasionally.

The limitations of the simulator used in this study may have had a modest effect on the outcome of some of the ratings. For example, the COBs in the study could not be configured with a weapon and could not be made to act hostile to the friendly units. Live vignettes would contribute greatly to the knowledge gleaned in this experiment. An additional study that analyzes the frequency of the usage of the information would also contribute to the body of knowledge gained in this experiment.

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APPENDIX A
CIR QUESTIONNAIRE RESULTS

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Vignette A, Planning Position

Please answer the following questions based on your experience. Answer all questions as accurately as possible. Circle the appropriate letter.

		QUESTIONS/Mean Responses																					
		q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12	q13	q14	q15	q16	q17	q18	q19	q20	q21	q22
Script		PLATOON LEADER																					
1	6.50	6.50	6.50	6.50	4.50	6.00	6.00	6.50	5.00	6.00	6.00	6.00	5.50	5.50	5.00	5.50	5.00	5.00	5.50	4.00	6.50	6.50	5.00
2	7.00	7.00	6.00	6.50	5.00	6.50	6.50	5.50	7.00	5.50	5.50	5.50	4.50	4.50	6.00	6.00	5.00	5.00	4.50	5.00	6.50	7.00	4.00
3	6.00	6.00	6.00	6.50	6.00	5.50	5.50	6.00	7.00	5.00	5.00	5.50	5.00	4.50	6.50	7.00	5.00	6.50	6.00	5.00	6.50	6.50	6.00
Total Mean	6.50	6.50	6.17	6.50	5.17	6.00	6.00	6.33	6.33	5.50	5.50	5.67	5.00	4.83	5.83	6.17	5.00	5.50	5.33	4.67	6.50	6.67	5.00
		SQUAD LEADER																					
1	6.67	6.67	6.67	6.00	6.33	6.00	6.33	6.33	6.33	6.33	5.33	6.33	6.00	6.33	6.00	6.00	5.67	5.00	5.00	5.00	5.33	6.00	6.00
2	5.67	6.00	5.67	6.00	5.67	5.67	5.67	7.00	6.33	5.67	5.67	5.00	5.00	5.00	5.00	5.67	5.00	5.67	5.33	5.33	6.00	6.33	5.67
3	6.00	6.00	6.00	7.00	5.50	6.50	6.50	7.00	6.50	6.50	5.50	5.50	5.50	5.50	6.00	6.50	5.00	5.00	5.50	4.50	6.50	6.50	5.00
Total Mean	6.11	6.22	6.11	6.33	5.83	6.06	6.06	6.78	6.39	6.17	5.50	5.61	5.50	5.61	5.67	6.06	5.22	5.22	5.28	4.94	5.94	6.28	5.56
		FIRE TEAM LEADER																					
1	5.80	6.00	5.80	5.80	5.60	5.60	5.60	5.60	NA	5.60	5.20	5.40	6.40	6.60	6.40	6.60	6.20	6.40	5.80	5.80	5.80	6.60	5.00
2	6.83	6.33	6.67	5.83	5.67	5.83	5.83	6.17	NA	6.33	6.00	5.50	6.17	4.83	6.17	6.33	5.50	6.33	5.50	6.17	5.67	5.83	5.50
3	6.50	6.00	6.00	6.25	5.00	5.25	5.00	6.75	NA	7.00	6.00	5.50	5.50	5.00	6.75	7.00	6.25	6.25	6.50	6.00	5.25	5.50	4.50
Total Mean	6.38	6.11	6.16	5.96	5.42	5.56	5.42	6.17	NA	6.31	5.73	5.47	6.02	5.48	6.44	6.64	5.98	6.33	5.93	5.99	5.57	5.98	5.00
		SQUAD MEMBER																					
1	6.24	6.18	6.18	5.94	5.65	5.94	5.65	6.12	NA	6.06	5.81	5.65	5.47	5.47	5.76	6.06	5.53	5.47	5.53	5.29	5.35	6.06	4.65
2	5.64	4.79	5.50	4.50	4.36	5.00	5.00	5.00	NA	5.07	5.14	4.36	5.07	4.43	5.50	5.36	4.57	4.77	4.64	4.75	5.07	5.07	4.29
3	6.42	5.83	6.25	5.42	5.33	5.25	5.33	6.00	NA	5.33	5.75	4.92	4.92	4.58	5.92	5.67	5.42	5.67	5.00	4.92	5.42	5.42	3.92
Total Mean	6.10	5.60	5.98	5.29	5.11	5.40	5.11	5.71	NA	5.49	5.57	4.98	5.15	4.83	5.73	5.70	5.17	5.30	5.06	4.99	5.28	5.52	4.29

(Questions) Vignette A, Planning Position

1. What size of OpFor force is located on your Platoon (Squad)'s objective?
2. Are there any crew-served automatic weapons that are located on your Platoon (Squad)'s objective?
3. Are there any Sniper-type weapons located on your Platoon (Squad)'s objective?
4. Are there any known obstacles located on the Platoon (Squad)'s objective?
5. What are the OpFor preparing for at this time?
6. Does the OpFor have any reinforcement capability?
7. Does the OpFor have the capability to employ NBC?
8. Draw a sketch of the floor plan of your Platoon (Squad)'s objective building(s).
9. Does the OpFor have any indirect fire capability?
10. Does the OpFor have any air support capability?
11. Are there any COBs located on your Platoon (Squad)'s objective?
12. How do we identify the COBs and differentiate them from the OpFor?
13. What, if any, is the status/temperament of the COBs at this time?
14. What is your Platoon (Squad) and/or Company's right and left limits for supporting fires?
(Describe using building numbers or terrain features.)
15. What is the signal to lift/shift supporting fires for your Platoon (Squad)/Company?
16. What unit is to the right of your Platoon (Squad)?
17. What time does the lead element cross the line of departure?
18. What/where is your secondary objective?
19. Do you have any attachments to your Platoon (Squad)?
20. On your Platoon (Squad) objective, where is the weakest OpFor location?
21. On your Platoon (Squad) objective, where is the strongest OpFor location?
22. Will weather impact your operation?

Vignette A, Occupy Attack Position

QUESTIONS/Mean Responses																								
Script	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12	q13	q14	q15	q16	q17	q18	q19	q20	q21	q22	q23	
	PLATOON LEADER																							
1	5.00	5.00	4.67	4.67	5.67	6.00	6.00	5.00	6.00	6.33	5.67	6.00	4.67	4.33	3.67	5.00	5.33	6.00	5.67	5.67	6.00	6.00	5.67	
2	3.00	2.00	4.50	3.00	6.00	7.00	7.00	6.00	6.00	6.00	6.00	6.50	4.00	3.50	4.50	5.50	6.50	5.00	5.50	6.00	5.50	6.00	5.50	
3	4.00	6.00	4.00	6.00	7.00	6.00	7.00	5.00	7.00	6.00	5.00	6.00	6.00	6.00	5.00	6.00	6.00	5.00	7.00	6.00	5.00	6.00	7.00	
Total Mean	4.00	4.33	4.39	4.56	6.22	6.33	6.67	5.33	6.33	6.11	5.56	6.17	4.89	4.61	4.39	5.50	5.94	5.33	6.06	5.89	5.50	6.00	6.06	
SQUAD LEADER																								
1	5.67	6.33	5.67	6.00	6.33	6.67	6.67	6.33	6.33	6.67	6.00	6.33	6.00	6.33	6.00	6.00	6.33	6.00	6.00	5.67	5.67	6.00	6.67	
2	3.67	4.00	3.67	4.00	4.33	6.33	6.00	5.33	5.67	5.33	5.67	6.67	5.00	5.33	5.33	5.33	5.67	5.33	6.33	6.33	6.00	5.67	6.33	
3	4.50	5.00	4.50	4.50	5.50	6.50	5.50	6.00	7.00	5.50	6.00	5.50	5.00	5.00	5.00	5.50	5.50	4.00	7.00	6.00	5.50	5.00	5.50	
Total Mean	4.61	5.11	4.61	4.83	5.39	6.50	6.06	5.89	6.33	5.83	5.89	6.17	5.33	5.55	5.44	5.61	5.83	5.11	6.44	6.00	5.72	5.56	6.17	
FIRE TEAM LEADER																								
1	5.40	5.60	5.20	4.80	5.80	5.60	5.60	5.80	5.60	6.20	5.80	5.80	5.60	5.40	5.80	5.60	5.80	5.40	6.00	5.80	5.40	5.20	5.80	
2	5.83	4.67	5.50	5.17	5.17	6.50	6.00	5.67	6.00	5.83	6.17	6.50	5.33	5.67	6.17	6.17	6.50	6.33	6.80	6.50	6.33	6.50	6.33	
3	5.25	5.00	5.00	5.75	6.00	6.25	6.75	5.50	7.00	6.50	5.25	5.75	6.00	6.50	5.50	5.50	6.00	4.00	6.33	6.25	4.75	6.25	4.75	
Total Mean	5.49	5.09	5.23	5.24	5.66	6.12	6.12	5.66	6.20	6.18	5.74	6.02	5.64	5.86	5.82	5.76	6.10	5.24	6.38	6.18	5.49	5.98	5.63	
SQUAD MEMBER																								
1	4.89	4.94	5.06	4.78	5.76	5.78	6.11	5.72	5.78	5.72	5.44	5.78	5.06	5.50	5.22	5.56	5.94	5.24	6.22	6.06	5.67	5.61	5.72	
2	4.29	4.50	4.07	4.36	4.50	6.29	6.00	5.36	5.23	5.29	5.36	5.43	4.86	5.21	5.07	5.00	5.36	4.64	5.29	5.50	4.79	4.93	5.21	
3	4.50	4.58	3.75	4.75	5.42	5.92	6.33	4.92	5.83	5.08	5.67	5.50	4.92	5.25	5.42	5.58	6.25	4.75	6.42	6.25	5.92	5.25	5.08	
Total Mean	4.56	4.67	4.29	4.63	5.23	6.00	6.15	5.33	5.61	5.36	5.49	5.57	4.95	5.32	5.24	5.38	5.85	4.88	5.98	5.94	5.46	5.26	5.34	

1. How many, if any, KIA OpFor are there on objective one?
2. What is the status of COBs on objective one?
3. How many, if any, KIA OpFor are there on objective two?
4. What is the status of COBs on objective two?
5. How many friendly KIA/WIA did the Platoon (Squad) receive on objective's one and two?
6. How many OpFor are on objective three?
7. Where, if any, are the OpFor located on objective three?
8. Are there any OpFor located in building C1?

(Questions cont) Vignette A, Occupy Attack Position

9. Are there any obstacles between objective two and three?
10. What are the OpFor (if any) most likely to do on objective three?
11. What are the OpFor preparing for at this time?
12. What size, if any, reinforcement capability does the OpFor possess?
13. What is the status/temperament of the COBs at this time?
14. How many members of the 1st Squad are located in building C5?
15. Are all members of third Squad located in C4 A and B?
16. What is the location of the unit on your right?
17. Do the OpFor have automatic weapons?
18. What is the morale of the OpFor?
19. What is the morale of the Platoon (Squad)?
20. Do the OpFor have any long-ranged sight capability?
21. Are the OpFor made up of elite, regular, or militia?
22. Are the OpFor standing in place, falling back to prepared positions, or are they running?
23. What is the construction of the building on your objective (i.e., triple brick, reinforced concrete, wood frame, etc.)?

Vignette A, Post Attack Position

QUESTIONS/Mean Responses																
Script	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12	q13	q14	q15	q16
PLATOON LEADER																
1	6.00	4.67	5.67	5.67	5.67	6.00	6.00	6.33	5.67	5.67	6.33	5.33	5.67	5.33	6.00	5.67
2	4.50	6.00	6.50	6.00	6.50	6.50	6.50	4.00	4.00	5.50	6.50	5.50	5.50	5.00	6.50	5.00
3	7.00	5.50	5.00	5.50	5.50	5.00	6.00	6.00	5.50	6.50	6.50	5.00	5.00	4.50	6.50	4.50
Total Mean	5.83	5.39	5.72	5.72	5.89	5.83	6.17	5.44	5.06	5.89	6.44	5.28	5.39	4.94	6.33	5.06
SQUAD LEADER																
1	6.33	6.33	6.33	6.00	6.33	6.50	5.67	5.67	5.00	6.00	6.67	6.33	5.67	5.67	5.67	6.00
2	5.67	6.00	5.00	5.00	6.00	5.67	6.33	5.33	5.33	5.67	5.67	5.67	5.00	5.00	6.33	5.67
3	6.00	6.50	6.00	5.00	5.00	6.50	7.00	5.00	5.00	5.00	5.00	6.50	5.00	5.50	7.00	6.00
Total Mean	6.00	6.28	5.78	5.33	5.78	6.22	6.33	5.33	5.11	5.56	5.78	6.17	5.22	5.39	6.33	5.89
FIRE TEAM LEADER																
1	6.40	6.20	5.80	5.40	5.40	5.60	5.60	5.20	5.00	5.80	5.80	5.40	5.40	5.40	5.60	5.40
2	6.67	6.17	6.00	6.17	5.83	6.00	6.00	5.50	4.50	5.67	6.33	6.17	6.17	5.83	6.83	6.00
3	6.75	4.75	5.50	5.75	5.25	5.75	6.25	5.50	5.25	5.75	5.75	6.50	6.75	6.25	7.00	6.50
Total Mean	6.61	5.71	5.77	5.77	5.49	5.78	5.95	5.40	4.92	5.74	5.96	6.02	6.11	5.83	6.48	5.97
SQUAD MEMBER																
1	5.89	5.72	5.78	5.50	5.50	5.67	5.78	5.78	5.39	5.83	5.83	5.72	5.50	5.44	6.39	5.72
2	6.00	5.57	5.07	4.93	4.50	4.36	5.14	5.00	4.71	5.36	5.64	4.86	4.69	4.71	5.93	5.14
3	6.17	5.75	5.67	5.25	5.50	5.17	5.08	4.83	4.67	5.67	5.83	5.75	4.92	5.17	6.25	5.50
Total Mean	6.02	5.68	5.51	5.23	5.17	5.07	5.33	5.20	4.92	5.62	5.77	5.44	5.04	5.11	6.19	5.45

1. How many OpFor were on your Platoon (Squad)'s objective?
2. To where did the OpFor on your 2nd Platoon (Squad)'s objective escape?
3. How long, if at all, will it take the OpFor to reinforce with at least a squad-size element?
4. What OpFor activity, if any, has been reported west of McKenna?
5. What is the current location, if any, of OpFor outside of McKenna?
6. In what direction, if any, was the OpFor unit outside of McKenna village reported to be moving?
7. Does the OpFor have the capability to reinforce McKenna with a platoon-size element?
8. What was the OpFor intent?

(Questions cont) Vignette A, Post Attack Position

9. How many, if any, COBs were on the Company's objective?
10. What is the current location of your 2nd Squad Leader?
11. How many, if any, friendly KIA/WIAs did your Platoon (Squad) receive during the attack?
12. What is your Squad/Company's next mission?
13. Where is the 2nd Platoon's CCP/EPW point located?
14. What is the disposition of your 1st Squad?
15. Do you have enough ammo to defend against counterattack?
16. Is fatigue an issue?

Vignette B, Planning Position

QUESTIONS/Mean Responses																						
Script	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12	q13	q14	q15	q16	q17	q18	q19	q20	q21	q22
PLATOON LEADER																						
1	6.00	5.50	5.00	5.50	6.00	4.50	5.00	5.00	5.50	6.00	4.50	4.50	4.50	4.50	5.50	4.50	4.50	4.00	5.00	6.50	5.50	4.50
2	7.00	6.00	6.00	6.00	6.00	2.00	6.00	6.00	6.00	7.00	4.00	6.00	7.00	6.00	7.00	6.00	6.00	6.00	7.00	6.00	5.00	5.00
3	6.50	5.50	6.50	5.50	6.00	4.00	7.00	5.50	5.00	7.00	4.50	5.50	7.00	6.00	7.00	6.00	4.50	5.00	6.50	6.00	4.50	6.50
Total Mean	6.50	5.67	5.83	5.67	6.00	3.50	6.00	5.50	5.50	6.67	4.33	5.33	6.17	5.50	6.50	5.50	5.00	5.00	6.17	6.17	5.00	5.33
SQUAD LEADER																						
1	6.67	5.67	6.00	6.67	6.00	5.33	5.33	5.67	5.67	6.33	5.33	6.33	6.33	6.00	6.33	6.67	6.67	6.00	6.33	6.00	6.33	5.67
2	6.67	5.67	5.67	6.00	6.00	5.67	6.33	6.00	6.00	6.67	5.00	7.00	7.00	7.00	6.67	7.00	6.00	6.67	7.00	6.67	6.67	6.67
3	6.50	6.00	6.00	6.00	6.50	5.00	6.50	7.00	5.00	5.50	4.50	7.00	5.50	5.50	5.50	5.50	5.00	4.50	5.00	5.50	6.00	5.50
Total Mean	6.61	5.78	5.89	6.22	6.17	5.33	6.05	6.22	5.56	6.17	4.94	6.78	6.28	6.17	6.17	6.39	5.89	5.72	6.11	6.06	6.33	5.95
FIRE TEAM LEADER																						
1	6.00	6.20	5.60	5.80	6.00	5.40	6.60	5.80	5.20	6.00	5.60	6.20	6.20	6.20	5.80	6.20	5.60	5.80	5.80	5.40	6.00	5.60
2	6.83	6.83	6.17	6.50	5.50	4.83	5.67	5.50	5.67	6.00	5.83	6.33	5.00	5.00	6.17	6.17	5.83	6.17	6.17	6.17	6.00	5.17
3	6.75	6.75	5.50	6.25	6.75	5.50	6.25	6.75	6.50	6.25	5.75	6.00	5.75	5.75	6.25	6.00	5.75	4.75	6.00	6.25	6.75	6.00
Total Mean	6.53	6.59	5.76	6.18	6.08	5.24	6.17	6.02	5.79	6.08	5.73	6.18	5.65	5.65	6.07	6.12	5.73	5.57	5.99	5.94	6.25	5.59
SQUAD MEMBER																						
1	5.67	5.72	5.89	5.78	5.61	4.83	5.65	5.44	5.22	6.06	5.00	6.00	5.71	5.71	6.06	5.78	5.61	5.39	5.89	6.00	5.28	5.50
2	5.87	5.40	5.47	5.40	5.27	4.53	5.53	5.53	5.07	5.67	4.53	5.80	5.13	5.60	5.79	5.57	5.50	5.14	5.93	5.79	5.29	4.93
3	5.75	5.50	5.67	5.50	5.42	4.75	5.83	5.58	5.50	6.08	5.00	6.42	6.00	6.33	6.42	5.33	5.33	5.00	5.58	5.83	5.92	5.08
Total Mean	5.76	5.54	5.68	5.56	5.43	4.70	5.67	5.52	5.26	5.94	4.84	6.07	5.61	5.88	6.09	5.56	5.48	5.18	5.80	5.87	5.50	5.17

1. What size OpFor force do you expect to counterattack the 2nd Platoon's position?
2. Does the Counterattack OpFor have any crew-served automatic weapons?
3. What are the OpFor preparing for at this time?
4. What size, if any, reinforcement capability does the OpFor possess?
5. Does the OpFor have any indirect fire capability?
6. What is the disposition of the COBs in McKenna village?
7. Describe your Platoon (Squad)'s sector of fire. (Use building numbers and terrain features, i.e., NW corner of building A1 to the cemetery.)

(Questions cont) Vignette B, Planning Position

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8. What are your primary Target Reference Point(s)?
9. What unit is to the right of your Platoon (Squad)?
10. What is the most likely OpFor avenue of approach for reinforcements?
11. Do you have any attachments to your Platoon (Squad)?
12. Does the enemy know the location of your Platoon (Squad)?
13. Which location in your Platoon (Squad) is weakest?
14. Which location in your Platoon (Squad) is strongest?
15. Which section of your Platoon (Squad) is currently exposed to enemy fire or attack?
16. Who has the advantage in the current situation?
17. How dispersed do you expect the enemy's formation to be during the counterattack?
18. Does the enemy have adequate ammunition for the counterattack?
19. Are there any building vantage points around your defensive position that would be advantageous for the enemy to occupy?
20. What is the projected area of enemy attack?
21. What are the priority of fires?
22. How will casualties be handled?

Vignette B, Defense Position

Script	QUESTIONS/Mean Responses											
	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12
	PLATOON LEADER											
1	4.50	5.50	5.50	5.50	5.00	5.50	5.00	4.00	5.00	4.00	5.00	4.50
2	7.00	6.00	6.00	6.00	7.00	4.00	6.00	4.00	6.00	2.00	6.00	7.00
3	4.50	4.50	5.00	6.00	5.50	6.00	7.00	5.00	5.00	6.00	7.00	7.00
Total Mean	5.33	5.33	5.50	5.83	5.83	5.17	6.00	4.33	5.33	4.00	6.00	6.17
SQUAD LEADER												
1	4.67	6.00	6.50	6.00	5.00	6.00	4.33	6.33	4.67	6.33	6.67	5.00
2	6.33	6.33	6.33	6.33	6.33	6.33	5.67	5.67	6.33	6.33	6.67	6.67
3	6.00	6.50	6.50	6.00	6.50	5.50	5.50	6.00	5.50	6.00	7.00	5.50
Total Mean	5.67	6.28	6.44	6.11	5.94	5.94	5.17	6.00	5.50	6.22	6.78	5.72
FIRE TEAM LEADER												
1	5.75	6.25	5.00	5.50	5.75	5.75	6.25	6.25	5.00	5.25	6.50	6.00
2	6.33	6.00	5.67	5.67	6.33	6.33	6.33	5.50	5.83	6.17	6.83	6.50
3	6.25	5.75	6.25	6.25	6.25	6.50	6.75	5.25	6.25	5.50	7.00	6.25
Total Mean	6.11	6.00	5.64	5.81	6.11	6.19	6.44	5.67	5.69	5.64	6.78	6.25
SQUAD MEMBER												
1	5.24	5.41	5.82	5.88	5.94	5.53	5.94	5.35	5.53	5.47	6.35	5.76
2	4.93	4.64	4.93	5.00	5.07	5.20	5.67	4.27	5.14	4.87	5.73	5.53
3	5.50	5.33	5.25	5.08	6.08	5.67	6.17	5.08	5.42	4.58	6.50	5.83
Total Mean	5.22	5.13	5.33	5.32	5.70	5.47	5.93	4.90	5.36	4.97	6.19	5.71

1. How long, if at all, will it take the OpFor to reinforce with at least a squad-size element?
2. What OpFor activity, if any, has been reported east of McKenna?
3. What is the current location, if any, of OpFor outside of McKenna?
4. In what direction, if any, was the OpFor unit outside of McKenna village reported to be moving?
5. Does the OpFor have the capability to reinforce McKenna with a platoon-size element?
6. What was the OpFor intent?
7. What is the current location of your 2nd Squad leader?
8. What is your 2nd Platoon (Squad)'s next mission?

(Questions cont) Vignette B, Defense Position

9. Where is your 2nd Platoon's CCP/EPW point located?
10. When do you expect a resupply of water and food?
11. What is your ammunition status?
12. Which area of your Platoon (Squad) is weakest?

Vignette C, Planning Position

QUESTIONS/Mean Responses																																		
Script	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12	q13	q14	q15	q16	q17	q18	q19	q20	q21	q22	q23	q24	q25	q26	q27	q28	q29	q30	q31			
PLATOON LEADER																																		
1	5.50	5.50	5.50	6.00	5.00	5.50	5.50	5.50	5.00	5.00	6.00	5.00	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.50	5.00	5.00	5.50	4.50	5.00	5.50	5.50	5.50	6.50	6.50	5.50	6.00		
2	6.00	7.00	7.00	7.00	7.00	5.00	5.00	6.00	5.00	5.00	5.00	4.00	4.00	4.00	6.00	7.00	7.00	7.00	6.00	6.00	6.00	7.00	7.00	6.00	5.00	7.00	3.00	4.00	5.00	4.00	6.00	6.00		
3	7.00	6.00	6.50	7.00	7.00	6.00	5.50	5.50	5.50	5.50	5.00	6.00	5.00	5.50	4.50	7.00	6.50	7.00	6.00	6.00	6.00	7.00	7.00	6.50	6.00	6.50	6.00	5.00	6.00	6.50	6.50	6.00		
Total Mean	6.17	6.17	6.33	6.67	6.33	5.50	5.33	5.67	5.17	5.17	5.33	5.00	5.00	4.83	5.17	6.33	6.17	6.33	5.67	5.83	5.83	6.33	6.50	5.67	5.33	6.33	4.83	5.17	6.00	5.33	6.00	6.00		
SQUAD LEADER																																		
1	6.67	5.33	5.33	6.00	6.00	5.33	5.00	6.33	5.67	6.00	5.00	4.67	4.67	5.67	4.33	6.00	6.00	5.00	5.00	5.67	5.33	6.00	6.00	5.00	4.67	6.00	4.33	5.33	5.33	5.33	5.33	5.33		
2	6.33	6.00	6.33	6.67	6.33	5.67	6.00	6.00	6.00	6.33	6.33	5.67	5.67	6.00	5.67	6.33	7.00	6.33	6.00	6.00	6.67	6.67	6.67	6.33	5.67	6.00	5.00	5.33	5.67	6.00	6.00	6.67		
3	6.50	6.00	6.50	6.50	6.50	6.00	6.00	6.00	6.00	7.00	7.00	5.50	4.50	4.50	4.00	6.50	6.00	6.00	6.00	6.00	6.50	7.00	7.00	6.50	7.00	6.00	4.50	5.00	5.00	5.50	5.00	6.00		
Total Mean	6.50	5.78	6.05	6.39	6.28	5.67	5.67	6.11	5.89	6.44	6.11	5.28	4.95	5.39	4.67	6.28	6.33	5.78	5.67	5.89	6.17	6.56	6.56	5.94	5.78	6.00	4.61	5.22	5.50	5.44	6.00	6.00		
FIRE TEAM LEADER																																		
1	6.00	6.40	6.00	6.00	6.20	5.40	5.20	5.60	5.80	5.60	6.00	6.00	5.60	5.80	6.00	5.80	6.40	6.00	5.80	5.60	6.20	6.20	5.80	6.00	6.00	6.40	5.60	5.60	5.80	5.80	5.80	6.00		
2	6.33	6.50	6.17	6.67	6.67	6.17	5.33	6.00	5.50	5.33	5.33	4.83	4.83	4.67	5.17	5.00	5.00	5.50	5.00	5.83	6.17	6.67	6.50	6.17	5.33	5.67	5.67	6.00	6.50	6.00	6.50	6.00		
3	6.50	6.50	6.50	6.25	6.00	6.25	5.25	6.00	6.50	6.50	6.75	5.75	5.25	5.75	5.50	5.50	6.25	5.50	6.50	6.50	6.00	6.00	6.25	5.75	5.50	5.75	4.75	4.75	5.75	5.25	5.25	5.25		
Total Mean	6.28	6.47	6.22	6.31	6.29	5.94	5.26	5.87	5.93	5.81	6.03	5.53	5.23	5.41	5.56	5.43	5.88	5.67	5.77	5.98	6.12	6.29	6.18	5.97	5.61	5.94	5.34	5.85	5.85	5.75	5.75	5.75		
SQUAD MEMBER																																		
1	5.53	5.87	6.13	5.87	6.00	5.47	5.33	5.67	5.73	5.50	5.60	5.33	5.40	5.33	5.40	5.64	5.80	5.73	5.80	5.93	6.00	6.20	5.60	5.27	5.73	5.87	5.33	5.13	5.67	5.93	5.73	5.73		
2	5.93	5.73	5.73	6.00	5.93	5.27	5.07	4.40	5.20	4.87	5.20	4.73	4.67	5.00	4.93	5.27	6.00	5.53	5.33	5.60	5.87	6.33	5.80	5.60	5.47	6.00	5.27	5.53	5.60	5.80	6.33	6.33		
3	6.17	5.83	5.67	6.17	6.00	5.83	4.75	5.50	4.58	4.75	6.00	4.50	4.25	4.58	5.08	5.08	5.75	5.50	5.75	5.42	5.75	5.92	5.75	5.08	5.17	5.67	4.83	5.50	5.75	5.50	5.58	5.58		
Total Mean	5.88	5.81	5.84	6.01	5.98	5.52	5.05	5.19	5.17	5.04	5.60	4.85	4.77	4.97	5.14	5.33	5.85	5.59	5.63	5.65	5.87	6.15	5.72	5.32	5.46	5.85	5.14	5.39	5.67	5.74	5.88	5.88		

1. What size of OpFor force is located on your Platoon (Squad)'s objective?
2. What type, if any, crew-served automatic weapons are located in/around your Platoon (Squad)'s objective?
3. Where, if any, are the crew-served automatic weapons located in/around your Platoon (Squad)'s objective?
4. Are there any Sniper-type weapons located in/around your Platoon (Squad)'s objective?
5. If there are Sniper-type weapons in/around the Platoon (Squad)'s objective, where are they located?
6. Are there any obstacles located in/around the Platoon (Squad)'s objective?

(Questions cont) Vignette C, Planning Position

7. What are the OpFor preparing for at this time?
8. Does the OpFor have any reinforcement capability?
9. Does the OpFor have any indirect fire capability?
10. Does the OpFor have any air support capability?
11. Does the OpFor have the capability to employ NBC?
12. How many COBs are located on your Platoon (Squad)'s objective?
13. What is the status/temperament of the COBs at this time?
14. What is the location, if any, of the COBs in your Platoon (Squad)'s objective?
15. What unit is to the right of your Platoon (Squad)?
16. Does the OpFor have any high tech (night vision devices, sensors, etc.) capability?
17. What, if any, are the locations of OpFor LP/OPs?
18. Has the OpFor been using patrolling activities outside of McKenna village?
19. If you make your approach to the observation point from the northwest, do you have terrain masking from McKenna excluding the tower in building C3?
20. If you make your approach to the observation point from the southwest, do you have terrain masking from McKenna excluding the tower in building C3?
21. What is the best approach to your observation point?
22. Will the terrain offer concealment during your observation?
23. Will you have good visibility of your recon objective (i.e., problems with fog, canopy, smoke, etc.)?
24. Are there any hazards (i.e., rivers, open areas, steep terrain, etc.) between you and your recon objective?
25. Do you expect any areas of poor communication on your route to the recon objective?
26. When approaching your planned observation point, are there any projected areas of enemy detection?
27. What light levels do you expect to encounter on your route?
28. What is the estimated time required to move to your observation point?
29. What is the projected safety of your route?
30. What is the experience level of your unit?
31. What type of resistance do you expect to encounter?

Vignette C, Recon Phase

		QUESTIONS/Mean Responses																			
Script	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12	q13	q14	q15	q16	q17	q18	q19	q20	
	PLATOON LEADER																				
1	4.50	5.50	7.00	5.50	5.50	4.00	5.50	5.50	5.50	5.50	6.00	5.50	6.00	5.50	4.50	5.00	6.00	4.50	5.50	5.00	
2	6.00	7.00	7.00	6.00	5.00	5.00	5.00	7.00	7.00	7.00	7.00	7.00	4.00	5.00	6.00	6.00	6.00	7.00	6.00	7.00	
3	6.50	5.00	5.00	5.00	5.50	5.00	5.00	5.00	6.00	6.50	6.00	4.50	4.50	5.00	6.50	6.50	6.00	6.00	6.00	5.50	
Total Mean	5.67	5.83	6.33	5.50	5.33	4.67	5.17	5.83	6.17	6.33	6.33	5.67	4.83	5.17	5.67	5.83	6.00	5.83	5.83	5.83	
		SQUAD LEADER																			
1	6.33	6.00	6.67	6.67	5.67	5.50	4.67	4.67	5.33	5.67	6.00	5.00	4.67	4.33	4.67	6.00	6.00	6.00	6.00	6.67	
2	6.67	6.33	5.67	5.33	5.33	5.00	5.33	6.67	6.67	6.33	6.33	6.33	6.33	6.33	6.67	5.67	5.67	6.67	6.33	6.67	
3	6.50	5.50	5.50	6.00	5.00	4.50	6.00	6.50	6.50	6.50	6.50	6.00	5.50	6.00	6.00	6.00	6.00	6.00	6.00	5.50	
Total Mean	6.50	5.94	5.95	6.00	5.33	5.00	5.33	5.95	6.17	6.17	6.28	5.78	5.50	5.55	5.78	5.89	5.89	6.22	6.11	6.28	
		FIRE TEAM LEADER																			
1	6.00	5.20	5.60	5.60	5.40	5.40	5.40	5.40	5.80	6.00	5.80	6.00	5.00	6.00	6.20	6.20	6.20	6.20	6.40	6.40	
2	6.67	6.00	6.33	6.33	4.67	4.50	4.83	6.33	6.17	6.83	6.50	5.33	4.83	5.67	6.00	6.17	6.33	6.33	5.83	6.67	
3	6.00	5.75	5.25	5.50	6.25	6.25	5.00	6.00	6.25	6.75	6.25	4.75	5.25	5.75	6.25	5.25	5.25	6.25	6.75	6.50	
Total Mean	6.22	5.65	5.73	5.81	5.44	5.38	5.08	5.91	6.07	6.53	6.18	5.36	5.03	5.81	6.15	5.87	5.93	6.26	6.33	6.52	
		SQUAD MEMBER																			
1	5.35	5.18	5.06	5.00	4.82	5.24	5.00	5.59	5.88	6.00	5.82	5.47	5.06	5.71	5.71	5.29	5.18	5.35	5.53	5.59	
2	6.07	4.93	5.33	5.00	5.13	4.93	4.07	5.47	5.73	6.13	6.20	5.67	5.00	4.80	5.73	5.40	5.27	5.33	5.60	6.00	
3	6.33	5.83	5.42	5.00	4.75	4.92	5.25	5.50	6.00	6.17	6.00	5.08	5.17	5.50	5.83	5.25	5.25	5.58	5.92	6.17	
Total Mean	5.92	5.31	5.27	5.00	4.90	5.03	4.77	5.52	5.87	6.10	6.01	5.41	5.08	5.34	5.76	5.31	5.23	5.42	5.68	5.92	

1. How many OpFor are/were there on your objective?
2. How long, if at all, will it take the OpFor to reinforce with at least a squad-size element?
3. What OpFor activity, if any, has been reported outside of McKenna?
4. What appears to be the OpFor's intent?
5. How many COBs are located on the objective?
6. What is the disposition, if any, of the COBs?
7. What is your Platoon (Squad)'s next mission?
8. Does the OpFor have any OP/LPs on the west or south sides of McKenna?

(Questions cont) Vignette C, Recon Phase

9. Where, if any, are the OpFor patrolling activities located?
10. What is the best approach to the objective for the Platoon (Squad)?
11. Does the OpFor have any long-range sights?
12. Does the OpFor have any night vision devices?
13. Are any friendly elements not executing plans per their orders?
14. Which Company (Platoon Squad) elements are in communication with you?
15. Which enemy element is your highest level threat?
16. Please mark on the map the entry points that can best be breached using explosives.
17. Please mark on the map the entry points that can best be breached using mechanical devices.
18. Please mark on the map the areas of fortification.
19. Which buildings are most accessible?
20. Please mark on the map the projected enemy field of fire/observation.

APPENDIX B
LITERATURE SEARCH RESULTS

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Table B-1. Results of Literature Search for Clearing a Building CIRs

DUTY POSITION	CIR	REFERENCE														
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA CE I	SME
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10				
RIFLEMAN	Enemy		X													
	Strength/Size															X
	Location		X										X	X		X
	Composition															
	Tactics															X
	Morale															
	Equipment		X													X
	Building															
	Construction															X
	Layout															X
	Boobytraps (in or around)															
	Terrain		X													
	Obstacles												X	X		X
	Visibility															
	Cover															
	Concealment															
	Trafficability															
	Urbanization															
	Environmental Condition		X													
	Location of Hazards		X													
	Status of Hazards		X													
	Troops															

DUTY POSITION	CIR	REFERENCE															
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA CEI	SME	
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10					
	Location of Teammates		X										X	X			
	Location of Friendly Forces		X										X	X		X	
	Availability of Ammo		X										X	X			
	Availability of Medical		X														
	Availability of Supplies		X										X				
	Time		X														
	Until Deployment																
	Of Attack															X	
	Civilian																
	Number of COB's															X	
	Location of COB's													X		X	
	How to ID COB's															X	
	Morale of COB's															X	
	Changes to the Situation		X													X	
	Signal																
	Marking of Cleared Room				X				X					X			
	Lift and Shift of fires				X				X					X		X	
TEAM LEADER	Enemy		X														
	Strength/Size																
	Location																
	Composition																
	Tactics																

DUTY POSITION	CIR	REFERENCE															
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA	CEI	SME
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10					
	Morale																
	Equipment		X														
	Building																
	Construction																
	Layout																
	Boobytraps (in or around)																
	Terrain		X														
	Obstacles																
	Visibility																
	Cover																
	Concealment																
	Trafficability																
	Urbanization																
	Environmental Condition		X														
	Location of Hazards		X														
	Status of Hazards		X														
	Troops																
	Location of Teammates		X														
	Location of Friendly forces		X														
	Availability of Ammo		X														
	Availability of Medical		X														
	Availability of Supplies		X														

DUTY POSITION	CIR	REFERENCE															
		ARI	ARI	ARI	FM	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA	SME
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10					
	Time																
	Until																
	Deployment		X														
	Of Attack																
	Civilian																
	Number of COB's																
	Location of COB's																
	How to ID COB's																
	Morale of COB's																
	Changes to the Situation		X														
	Signal																
	Marking of Cleared Room				X			X		X	X	X					
	Lift and Shift Of fires				X			X		X	X	X					
	Rules of Engagement					X				X							
SQUAD LEADER	Enemy		X														
	Strength/Size		X		X					X							
	Location																
	Composition																
	Tactics																
	Morale																
	Equipment																
	Building		X		X					X							
	Construction																
	Layout				X						X						
	Bobytraps (in or around)																

DUTY POSITION	CIR	REFERENCE																											
		ARI	ARI	ARI	FM	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	ARTEP	JE-1	JE-2	SA	CEI	SME										
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10																	
	<i>Terrain</i>		X																										
	Obstacles				X																X								
	Visibility																												
	Cover				X															X									
	Concealment				X															X									
	Trafficability																												
	Urbanization																												
	Environmental Condition																												
	Location of Hazards																												
	Status of Hazards																												
	<i>Troops</i>																												
	Location of Teamates		X																										
	Location of Friendly Forces		X																										
	Availability of Ammo		X																										
	Availability of Medical		X																										
	Availability of Supplies		X																										
	Condition of Soldiers		X																										
	Availability of Soldiers		X																										
	Communication Status		X																										

DUTY POSITION	CIR	REFERENCE																	
		ARI	ARI	ARI	FM	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	ARTEP	JE-1	JE-2	SA	CEI	SME
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10							
PLATOON LEADER	Time																		
	Until Deployment Of Attack																		
	Arrival Time of Other Soldiers		X																
	Civilian																		
	Number of COB's																		
	Location of COB's																		
	How to ID COB's																		
	Morale of COB's Changes to the Situation		X																
	Loss of Leaders		X																
	Signal																		
	Marking of Cleared Room				X			X				X	X						
	Lift and Shift Of fires				X			X				X	X						
	Rules of Engagement					X				X									
	Enemy	X	X		X						X								
	How to Attack	X			X							X							
	Strength/Size		X	X	X							X	X						
	Location		X	X	X							X	X						
	Composition			X	X								X						
	Tactics			X															
Morale			X																
Equipment			X																

DUTY POSITION	CIR	REFERENCE															
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA CEI	SME	
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10					
	Building	X															
	Construction	X		X													
	Layout	X		X													
	Boobytraps (in or around)	X		X													
	Point of Entry	X		X													
	Flow of the Clearing	X															
	Terrain		X														
	Obstacles			X													
	Visibility	X															
	Cover	X		X	X		X				X						
	Concealment	X		X	X		X				X						
	Trafficability	X															
	Urbanization																
	Environmental Condition			X													
	Location of Hazards	X		X												X	
	Status of Hazards			X												X	
	Relocation Point				X						X						
	Route	X		X													
	Troops																
	Location of Teammates	X	X														
	Location of Friendly Forces		X	X													
	Availability of Ammo	X	X	X													
	Availability of Medical		X	X													

DUTY POSITION	CIR	REFERENCE																	
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	ARTEP	JE-1	JE-2	SA CEI	SME		
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10							
	Availability of Supplies	X	X	X															
	Condition of Soldiers	X	X	X															
	Availability of Soldiers		X																
	Communication Status	X	X	X															
	Time																		
	Until Deployment		X	X															
	Of Attack			X															
	Civilian																		
	Number of COB's			X															
	Location of COB's			X															
	How to ID COB's																		
	Morale of COB's			X															
	Changes to the Situation		X	X															
	Loss of Leaders		X	X															
	Signal																		
Marking of Cleared Room			X	X			X						X	X					
Lift and Shift Of fires			X	X			X						X	X					
Rules of Engagement			X		X				X								X		

Table B-2. Results of Literature Search for Defending a MOUT Objective CIRs

DUTY POSITION	CIR	REFERENCE															
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA CEI	SME	
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10					
RIFLEMAN	Enemy				X												
	Strength/Size				X						X					X	
	Location				X						X					X	
	Composition																
	Tactics															X	
	Morale																
	NBC contamination				X											X	
	Building																
	Construction																
	Layout																
	Boobytraps (in or around)				X						X					X	
	Terrain				X						X					X	
	Obstacles				X						X					X	
	Visibility																
	Cover																
	Concealment																
	Trafficability																
	Urbanization																
	Environmental Condition																
	Location of Hazards																
	Status of Hazards																
	Troops					X						X					
	Location of Teammates					X						X					

DUTY POSITION	CIR	REFERENCE																
		ARI	ARI	ARI	FM	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	ARTEP	JE-1	JE-2	SA CEI	SME
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10	7-10	7-10				
	Location of Friendly Forces				X									X				X
	Sectors of Fire				X									X				
	Secondary Position				X			X						X				
	Route				X			X						X				
	Counterattack				X			X						X				
	Availability of Ammo				X													
	Availability of Medical																	X
	Availability of Supplies				X									X				
	Communication Equipment				X									X				X
	Time				X									X				X
	Until Deployment																	X
	Of Attack																	X
	Civilian																	X
	Number of COB's																	
	Location of COB's																	
	How to ID COB's																	X
	Morale of COB's																	
	Changes to the Situation																	
	Information from RECON				X									X				
	Rules of Engagement					X												

DUTY POSITION	CIR	REFERENCE																
		ARI	ARI	ARI	FM	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA	CEI	SME
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10						
TEAM LEADER	Enemy				X													
	Strength/Size																	
	Location				X													
	Composition																	
	Tactics																	
	Morale																	
	NBC																	
	contamination				X													
	Building																	
	Construction																	
	Layout																	
	Boobytraps (in or around)				X													
	Terrain				X													
	Obstacles																	
	Visibility																	
	Cover																	
	Concealment																	
	Trafficability																	
	Urbanization																	
	Environmental																	
	Condition																	
	Location of																	
	Hazards																	
	Status of																	
Hazards																		
Troops				X														
Location of				X														
Teammates				X														
Location of																		
Friendly Forces																		

DUTY POSITION	CIR	REFERENCE																
		ARI	ARI	ARI	FM	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA	CEI	SME
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10						
	Security				X								X					
	Availability of Ammo																	
	Secondary Position			X	X		X						X	X				
	Route			X	X		X						X	X				
	Counterattack			X	X		X						X	X				
	Sectors of Fire			X	X		X						X	X				
	Availability of Medical												X					
	Availability of Supplies																	
	Communication Equipment				X								X					
	Time				X								X					
	Until Deployment																	
	Of Attack																	
	Civilian																	
	Number of COB's																	
	Location of COB's																	
	How to ID COB's																	
	Morale of COB's																	
	Changes to the Situation																	
	Information from RECON			X														
	Rules of Engagement					X												
	Signals																	
	Unit Signal			X	X			X					X	X				

DUTY POSITION	CIR	REFERENCE														SA	CEI	SME
		ARI	ARI	ARI	FM	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	ARTEP	JE-1	JE-2		
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10	7-10	7-10				
	Challenge and Password				X			X				X	X	X				
	Final protective fire				X			X				X	X	X				
	Running Password				X			X				X	X	X				
	Lift and Shift				X			X				X	X	X				
	Of fires																	
SQUAD LEADER	Enemy				X							X						
	Strength/Size																	
	Location				X							X						
	Composition																	
	Tactics																	
	Morale																	
	NBC																	
	contamination				X													
	Building																	
	Construction																	
	Layout																	
	Boobytraps (in or around)				X							X						
	Terrain				X							X						
	Obstacles																	
	Visibility																	
	Cover																	
	Concealment																	
	Trafficability																	
	Urbanization																	
	Environmental																	
	Condition																	
	Location of																	
	Hazards																	
	Status of																	
	Hazards																	

DUTY POSITION	CIR	REFERENCE															
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA	CEI	SME
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10					
	Information from RECON				X												
	Rules of Engagement					X				X							
	Signals																
	Unit Signal				X			X			X						
	Challenge and Password				X			X			X						
	Final protective fire				X			X			X						
	Running Password				X			X			X						
	Lift and Shift				X			X			X						
	Of fires																
	Enemy				X						X						
PLATOON LEADER	Strength/Size																
	Location				X												
	Composition																X
	Tactics																X
	Morale																
	NBC				X												
	contamination																
	Building																
	Construction																
	Layout																
	Boobytraps (in or around)				X												
	Terrain				X												
	Obstacles																
	Visibility																
	Cover																
	Concealment																

DUTY POSITION	CIR	REFERENCE													
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SACEI
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10			SME
	Trafficability														
	Urbanization														
	Environmental Condition														
	Location of Hazards														
	Status of Hazards														
	Troops				X						X				
	Location of Teammates				X						X				
	Location of Friendly Forces														
	Security				X						X				
	Sectors of Fire				X						X				
	Secondary Position				X			X			X	X			
	Route				X			X			X	X			
	Counterattack				X			X			X	X			
	Availability of Ammo				X						X				X
	Availability of Medical														
	Availability of Supplies				X						X				
	Communication Equipment				X						X				
	Time														
	Until														
	Deployment														
	Of Attack														
	Civilian														
	Number of COB's														

DUTY POSITION	CIR	REFERENCE															
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA	CEI	SME
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10					
	Location of COB's																
	How to ID COB's																
	Morale of COB's																
	Changes to the Situation																
	Information from RECON				X						X						
	Rules of Engagement					X											
	Signals																
	Unit Signal				X			X			X	X					
	Challenge and Password				X			X			X	X					
	Final protective fire				X				X		X		X				
	Running Password				X						X	X					
	Lift and Shift Of fires				X				X		X	X					

Table B-3. Results of Literature Search for Reconnoitering a MOUT Objective

DUTY POSITION	CIR	REFERENCE												
		ARI	ARI	ARI	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA CEI
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10		SME
RIFLEMAN	<i>Enemy</i>						X							
	Strength/Size													X
	Location (LP/Ops)						X							X
	Composition													
	Tactics													X
	Morale													
	Equipment (NVGs, Sensors)													X
	<i>Building</i>													
	Construction													X
	Layout													X
	Boobytraps (in or around)													X
	<i>Terrain</i>													
	Obstacles													X
	Layout Using OCOKA						X							
	Visibility													
	Cover													
	Concealment													
	Trafficability													
	Urbanization													
	Environmental Condition													
	Location of Hazards													
	Status of Hazards													

DUTY POSITION	CIR	REFERENCE														
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA CEI	SME
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10				
	Troops					X										
	Location of Teammates															X
	Location of Friendly Forces															
	Availability of Ammo															
	Availability of Medical															
	Availability of Supplies															
	Time															
	Until Deployment															X
	Of Attack															
	Civilian															X
	Number of COB's															X
	Location of COB's															X
	How to ID COB's															X
	Morale of COB's															X
	Changes to the Situation															
	Rules of Engagement				X				X							
	Signals															X
	Near and Far				X			X					X			
	Challenge and Password				X			X					X			
	Running Password				X			X					X			

DUTY POSITION	CIR	REFERENCE																	
		ARI	ARI	ARI	FM	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2	SA	CE	I	SME
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10							
TEAM LEADER	Enemy									X									
	Strength/Size																		
	Location (LP/Ops)																		
	Composition																		
	Tactics																		
	Morale																		
	Equipment (NVGs, Sensors)																		
	Building																		
	Construction																		
	Layout																		
	Boobytraps (in or around)																		
	Terrain																		
	Obstacles																		
	Layout Using OCOKA						X												
	Visibility																		
	Cover																		
	Concealment																		
	Trafficability																		
	Urbanization																		
	Environmental Condition																		
	Location of Hazards																		
	Status of Hazards																		

DUTY POSITION	CIR	REFERENCE												
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10		SA CE I
	<i>Troops</i>						X							
	Location of Teammates													
	Location of Friendly Forces													
	Availability of Ammo													
	Availability of Medical													
	Availability of Supplies													
	<i>Time</i>													
	Until													
	Deployment													
	Of Attack													
	<i>Civilian</i>													
	Number of COB's													
	Location of COB's													
	How to ID COB's													
	Morale of COB's													
	Changes to the Situation													
	Rules of Engagement					X				X				
	Signals													
	Near and Far				X			X			X	X		
	Challenge and Password				X			X			X	X		
	Running Password				X			X			X	X		

[illegible]

DUTY POSITION	CIR	REFERENCE													
		ARI	ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10	SA	CEI	SME
	Troops						X								
	Location of Teammates														
	Location of Friendly Forces														
	Availability of Ammo														
	Availability of Medical														
	Availability of Supplies														
	Coordinating Instruction						X								
	Timeline Update						X								
	Time														
	Until														
	Deployment														
	Of Attack														
	Civilian														
	Number of COB's														
	Location of COB's														
	How to ID COB's														
	Morale of COB's														
	Changes to the Situation														
	Rule of Engagement					X				X					
	Signals														
	Near and Far				X			X			X	X			
	Challenge and Password				X			X			X	X			
	Running Password				X			X			X	X			

[illegible]

DUTY POSITION	CIR	REFERENCE												
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	JE-1	JE-2
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10		SA CE I
		SMI												
	Troops						X							
	Location of Teammates													
	Location of Friendly Forces													
	Availability of Ammo													
	Availability of Medical													
	Availability of Supplies						X							
	Coordinating Instruction						X							
	Timeline Update						X							
	Rehearsals						X							
	Security						X							
	Time													
	Until													
	Deployment													
	Of Attack													
	Civilian													
	Number of COB's													
	Location of COB's													
	How to ID COB's													
	Morale of COB's													
	Changes to the Situation													
	Rules of Engagement					X								
										X				

DUTY POSITION	CIR	REFERENCE																
		ARI	ARI	ARI	FM	FM	FM	FM	FM	SH	ARTEP	ARTEP	ARTEP	JE-1	JE-2	SA	CEI	SME
		1728	1753	1770	7-8	7-10	17-92	90-10-1	7-85	21-76	7-8	7-10						
	Signals																	
	Near and Far				X			X				X	X					
	Challenge and				X			X				X	X					X
	Password																	
	Running				X			X				X	X					
	Password																	

APPENDIX C
SMART SENSOR WEB DEMOGRAPHIC
QUESTIONNAIRE RESULTS

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SMART SENSOR WEB
DEMOGRAPHIC QUESTIONNAIRE RESULTS

ARMY

SAMPLE SIZE = 17

<u>RANK</u>	<u>AGE</u>	<u>DUTY POSITION FOR THIS EXPERIMENT</u>
E-2 - 2 E-5 - 5	Mean = 24	
E-3 - 1 2LT - 1	(Range 18 - 29 years)	Platoon Leader - 2
E-4 - 7 1LT - 1		Squad Leader - 1
		Team Leader - 4
		Rifleman - 9
		SAW - 1

1. Handedness: 13 Right 3 Left 1 NR
2. Height: Mean = 70 inches (Range 64 to 76)
3. Weight: Mean = 189 pounds (Range 121 to 254)
4. Vision:
 - a. Do you wear glasses when performing military duties?
4 Yes 13 No
 - b. Do you wear contact lenses when performing military duties?
1 Yes 16 No
 - c. Is your vision in each eye 20/20 or correctable to 20/20?
12 Yes 5 No
5. Education: Mean = 13 years
6. Current MOS Months (Mean) in Current MOS

11A - 1	43 months
11B - 2	
11M - 14	
7. Months (Mean) in current job = 25 months
8. Months (Mean) of experience in Infantry-related MOS = 39 months
9. Months (Mean) of military service = 47 months

10. Months (Mean) in these leadership positions:
- a. Fire Team Leader = 5 months
 - b. Squad Leader = 1 month
11. Months (Mean) of military training/instruction received in light infantry operations:
- a. Classroom training at Infantry school = 2 months
 - b. Field exercises (i.e., NTC, JOTC, CRTC, JRTC, = 8 months
MOUT training)
12. Months (Mean) of military training/instruction received in the following areas:
- a. Land navigation (map reading, use of GPS data, = 6 months
following planned route)
 - b. Route planning = 1 month
 - c. Communications = 5 months
13. Latest Physical Fitness (PFT) Score (Mean) = 258 (out of 300)
14. Latest Firing Qualification Test (FQT) Score (Mean) = 34 (out of 40)
- Type of weapon: M4 - 2
(how many used) M16 - 13
M203 - 1
NR - 1

15. Self rating of Knowledge, Skills, and Abilities (KSA) related to Infantry duties:

1	2	3	4	5
poor	below average	average	above average	outstanding
MEAN RESPONSE				
Knowledge of Infantry tactics, techniques, and procedures (TTP).				3.59
Knowledge of computers.				3.18
Knowledge of electronics.				2.71
Knowledge of mechanics and maintenance procedures for weapon systems and equipment used.				3.53
Knowledge of map reading and orientation in field setting.				3.71
Knowledge of land navigation.				3.59
Knowledge of reconnaissance, surveillance, and target acquisition procedures.				2.44
Knowledge relating to communications equipment and communications procedures.				2.88
Marksmanship skills.				4.24
Map reading skills.				3.59
Land navigation skills.				3.53
Computer skills (keyboards, mouse, track balls, navigating in and out of menus, etc.).				3.35
Communication skills (ability to use communications equipment and face-to-face communications to enhance mission accomplishment).				3.41
Leadership skills				3.88

16. a. Months (Mean) of military deployment for peacekeeping, peace enforcement, stability operations of combat = 5 months

b. If so, where? Korea

NATIONAL GUARD

SAMPLE SIZE = 48

<u>RANK</u>		<u>AGE</u>	<u>DUTY POSITION</u> <u>FOR THIS EXPERIMENT</u>
E-1 - 3	E-7 - 2	Mean = 31	
E-2 - 4	E-9 - 1	(Range 17 - 53 years)	Platoon Leader - 2
E-3 - 4	1LT - 1		Squad Leader - 7
E-4 - 16	2LT - 1		Team Leader - 9
E-5 - 7	CPT - 2		Rifleman - 20
E-6 - 7			SAW - 7
			NR - 3

1. Handedness: 40 Right 7 Left 1 NR

2. Height: Mean = 70 inches (Range 61 to 78)

3. Weight: Mean = 189 pounds (Range 126 to 275)

4. Vision:

a. Do you wear glasses when performing military duties?

9 Yes 38 No 1 NR

b. Do you wear contact lenses when performing military duties?

4 Yes 43 No 1 NR

c. Is your vision in each eye 20/20 or correctable to 20/20?

42 Yes 6 No

5. Education: Mean = 13.6 years

6. Current MOS Months (Mean) in Current MOS

11A - 3 13B - 2

61 months

11B - 3 31U - 1

11M - 36 91B - 1

NR - 2

7. Months (Mean) in current job = 33 months

8. Months (Mean) of experience in Infantry-related MOS = 95 months

9. Months (Mean) of military service = 115 months

10. Months (Mean) in these leadership positions:

- a. Fire Team Leader = 13 months
- b. Squad Leader = 18 months

11. Months (Mean) of military training/instruction received in light infantry operations:

- a. Classroom training at Infantry school = 7 months
- b. Field exercises (i.e., NTC, JOTC, CRTC, JRTC, = 9 months
MOUT training)

12. Months (Mean) of military training/instruction received in the following areas:

- a. Land navigation (map reading, use of GPS data, = 22 months
following planned route)
- b. Route planning = 15 months
- c. Communications = 23 months

13. Latest Physical Fitness (PFT) Score (Mean) = 239 (out of 300)

14. Latest Firing Qualification Test (FQT) Score (Mean) = 36 (out of 40)

Type of weapon:	SAW	-	2
(how many used)	M16	-	38
	M9	-	3
	NR	-	5

15. Self rating of Knowledge, Skills, and Abilities (KSA) related to Infantry duties:

1	2	3	4	5
poor	below average	average	above average	outstanding
MEAN RESPONSE				
Knowledge of Infantry tactics, techniques, and procedures (TTP).				3.15
Knowledge of computers.				3.09
Knowledge of electronics.				2.87
Knowledge of mechanics and maintenance procedures for weapon systems and equipment used.				3.43
Knowledge of map reading and orientation in field setting.				3.45
Knowledge of land navigation.				3.28
Knowledge of reconnaissance, surveillance, and target acquisition procedures.				2.96
Knowledge relating to communications equipment and communications procedures.				3.02
Marksmanship skills.				3.77
Map reading skills.				3.34
Land navigation skills.				3.30
Computer skills (keyboards, mouse, track balls, navigating in and out of menus, etc.).				3.34
Communication skills (ability to use communications equipment and face-to-face communications to enhance mission accomplishment).				3.26
Leadership skills				3.43

16. a. Months (Mean) of military deployment for peacekeeping, peace enforcement, stability operations of combat = 2 months

b. If so, where? Panama - 2 Saudi Arabia - 1
 Korea - 3 Bosnia - 2
 Kuwait - 3

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1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE March 2002		3. REPORT TYPE AND DATES COVERED Final	
4. TITLE AND SUBTITLE Virtual Environment Study of Mission-Based Critical Information Requirements				5. FUNDING NUMBERS AMS Code 622716 PR: AH70	
6. AUTHOR(S) Redden, E.S. (ARL)					
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Research Laboratory Human Research & Engineering Directorate Aberdeen Proving Ground, MD 21005-5425				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Laboratory Human Research & Engineering Directorate Aberdeen Proving Ground, MD 21005-5425				10. SPONSORING/MONITORING AGENCY REPORT NUMBER ARL-TR-2636	
11. SUPPLEMENTARY NOTES					
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.				12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The Human Research and Engineering Directorate of the U.S. Army Research Laboratory conducted an experiment to determine the critical information required by soldiers in four echelons (squad member, fire team leader, squad leader, and platoon leader). This information is intended for use in the development of the design requirements for information systems such as the Smart Sensor Web. The experiment was conducted in the Dismounted Battlespace Battle Lab's Squad Synthetic Environment (SSE), a virtual environment that allows the squad to participate in force-on-force exercises. A validation study of the SSE was conducted before the start of the experiment to ensure that information gathered in the virtual environment would be comparable to that gathered in a live experiment. The eight squads that participated in the experiment conducted infantry operations using scripted vignettes that were prepared to include as many situations as possible that are typically encountered during infantry operations. After participation in each vignette, soldiers rated the criticality of each of the situational awareness (SA) items on a questionnaire. This questionnaire was developed after a literature search and a subject matter expert conference that were conducted to gather potential SA critical information items.					
14. SUBJECT TERMS critical information requirements virtual environment CIRs				15. NUMBER OF PAGES 85	
				16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified		20. LIMITATION OF ABSTRACT	